REMARKS

By this amendment, claim 11 has been cancelled, claims 1, 2, 4-7, 9 and 10 have been amended, and claims 12 and 13 have been added. Thus, claims 1-10, 12 and 13 are now active in the application. Reexamination and reconsideration of the application are respectfully requested.

The specification and abstract have been carefully reviewed and revised to make grammatical and idiomatic improvements in order to aid the Examiner in further consideration of the application. The amendments to the specification and abstract are incorporated in the attached substitute specification and abstract. No new matter has been added.

Attached hereto is a marked-up version of the changes made to the specification and Abstract by the current amendment. The attachment is captioned "**Version with markings to show changes made**."

In item 1 of page 2 of the Office Action, the disclosure was objected to for inclusion of the phrase "excluding a region with a predetermined width" on page 6 of the specification. The Examiner also recommended reviewing the specification for proper idiomatic English.

Accordingly, in the above-mentioned substitute specification, numerous revisions have been made to improve the English grammar and US form of the specification, and in particular, to address the Examiner's concern relating to the phrase " excluding a region with a predetermined width." The paragraph containing this phrase has now been thoroughly revised to clearly describe the subject matter as shown in the drawings, wherein the under cuts 153 are formed in the outer circumferential surface 150 of the piston 140 outside of certain regions of the outer circumferential surface 150. In other words as shown in the drawing figures, and in particular in Figs. 3 and 4, the under cuts 153 are not formed in the regions along the upper sliding surface 154, the lower sliding surface 155 and the side sliding surfaces 160. These sliding surfaces 154, 155 and 160 exist at the outer circumferential surface 150 in a parallel direction 147 and a perpendicular direction 148, as viewed in the axial direction of the piston 140, as shown in Fig. 4.

In items 2-6 on page 2 of the Office Action, the Examiner presented objections to claims 1, 5, 9 and 11 for the inclusion of unclear claim language. These objections are believed moot in view of the amendments to these claims, as set forth above. Thus, claim 1 now clearly recites that, as viewed in an axial direction of the piston (see Fig. 4), an undercut 153 is formed in the outer circumferential surface 150 outside a sliding surface (154, 155, 160) thereof existing in a parallel direction (i.e., at the line 147) and a perpendicular direction (i.e., at the line 148) of the piston pin 142.

In items 7-34 on pages 3-11 of the Office Action, claims 1-6, 9 and 10 were rejected under 35 U.S.C. 103(a) as being unpatentable over Kojima Takeshi (JP2004-027969; hereinafter referred to as "Kojima") in view of Ellermann et al. (US 4,599,935); claim 7 was rejected under 35 U.S.C. 103(a) as being unpatentable over Kojima in view of Ellermann et al. and further view of Helt (US 6,282,910); claim 8 was rejected under 35 U.S.C. 103(a) as being unpatentable over Kojima in view of Ellermann et al. and further in view of Numoto et al. (US 6,083,132); and claim 11 was rejected under 35 U.S.C. 103(a) as being unpatentable over Kojima in view of Ellermann et al. and further view of Klotz et al. (US 5,860,395). These rejections are respectfully traversed and, in any event, are believed clearly inapplicable to the claims as now presented, for the following reasons.

With exemplary reference to the present drawing figures 1-6, independent claim 1 sets forth a hermetic compressor comprising a housing 101, 106 which contains oil and houses a compression mechanism 105 for compressing a refrigerant gas, the compression mechanism 105 comprising: a crankshaft 110 disposed in a vertical direction and having a main shaft 111 and an eccentric shaft 112; a block forming a cylinder 131 having a cylinder axis; a piston 140 arranged to reciprocate in the cylinder 131 in a direction of the cylinder axis, the piston having an outer circumferential surface 150 and a top surface 151; a piston pin 142 disposed in the piston 140 such that a center axis of the piston pin 142 is parallel to the eccentric shaft 112; a connecting rod 146 for connecting the eccentric shaft 112 to the piston pin 142; and an oil supplying structure for supplying the oil to an outer circumferential surface 150 of the piston 140; wherein the piston

140 has an under cut 153 formed in the outer circumferential surface 150 outside a sliding surface (154, 155, 160) thereof existing in a parallel direction 147 and a perpendicular direction 148 of the piston pin 140, as viewed in an axial direction of the piston (as shown in Fig. 4); and wherein the under cut 153 is separated from the top surface 151 of the piston 140 and, at least when the piston 140 is in a bottom dead center position (as illustrated in Fig. 1), communicates with space inside the housing 101.

Thus, according to claim 1, as viewed in Fig. 4, the under cut 153 is formed in the outer circumferential surface 150 outside (i.e., not within) a sliding surface 154, 155, 160 thereof. The sliding surface 154, 155, 160 is defined in claim 1 with reference to the view of Fig. 4 (i.e., "as viewed in an axial direction of the piston") as the particular part of the outer circumferential surface 150 that exists "in a parallel direction and a perpendicular direction of the piston pin, as viewed in the an axial direction of the piston." In other words, the sliding surface 154, 155, 160 is the portion of the outer circumferential surface 150 that exists in a parallel direction 147 and a perpendicular direction 148 as viewed in Fig. 4. Therefore, the sliding surface is the surface 154 at the top of the figure in Fig. 4, the surface 155 at the bottom of the figure in Fig. 4, and the two side surfaces 160 at the left side and the right side of the figure in Fig. 4, at the outer circumferential surface 150.

In contrast to the present invention as recited in claim 1, and as apparently recognized by the Examiner, although the Kojima reference discloses a hermetic compressor including a housing 1, a compression mechanism 6 including a crank shaft 10, a cylinder 17, a piston 20, a piston pin 22, a connecting rod 21, and an oil supplying structure 14, the Kojima reference does not disclose or suggest an under cut configured in the manner set forth in the claims. The Examiner cited the Ellermann et al. patent for disclosing an under cut 14 (or 6) formed in the outer circumferential surface 11 of a piston. However, the Ellermann et al. patent also clearly does not disclose or suggest the present invention as recited in claim 1.

Specifically, Fig. 2 of Ellermann et al. shows the piston thereof viewed along a parallel direction of the piston pin hole 10 (i.e., the hole 10 within which the piston pin is to be disposed),

and thus, Fig. 1 shows the piston in the perpendicular direction of the piston pin (i.e., along a direction perpendicular to the axis of the piston pin hole) (see the "Brief Description of the Drawings" in column 3 of the Ellermann et al. patent which describes Fig. 1 as being a view of a piston pin "in a direction at right-angles to the gudgeon pin axis." It is noted that the term "gudgeon pin" is another term for "piston pin."). With this in mind, the under cut 14 (as referenced by the Examiner with respect to the Ellermann et al. patent) is formed within the sliding surface of Ellermann et al. that exists in a perpendicular direction of the piston pin as viewed in an axial direction of the piston. Therefore, whereas claim 1 requires the under cut 153 to be formed in the outer circumferential surface outside the sliding surface existing in the perpendicular direction of the piston pin as viewed in the axial direction of the piston, Ellermann et al. discloses the under cut 14 as being formed in the outer circumferential surface within the sliding surface that exists in the perpendicular direction of the piston pin as viewed in the axial direction of the piston.

The Examiner cited the Helt patent for disclosing "how power at a nominal frequency from a power supply is input to an inverter which converts that power to a reduced frequency at its output . . .". The Examiner cited the Numoto et al patent for disclosing "that R600A refrigerant is used in a refrigeration cycle." The Examiner further cited the Klotz patent for disclosing "an under cut being formed with a recess (80') that does not extend all the way to the skirt surface." However, these tertiary references clearly provide no teaching or suggestion that would have obviated the above-discussed shortcomings of the Kojima and Ellermann et al. references.

Therefore, for the reasons presented above, it is believed apparent that the present invention as recited in claim 1 is clearly not disclosed or suggested in either the Kojima patent or the Ellermann et al. patent or in any reasonable combination thereof or with the tertiary references. As such, it is submitted that a person having ordinary skill in the art would not have found it obvious to modify the Kojima reference or a combination of Kojima and Ellermann et al, in such a manner as to result in or otherwise render obvious the present invention of claim 12.

Therefore, it is respectfully submitted that claim 1, as well as 2-8 and 12 which depend therefrom, are clearly allowable over the prior art of record.

Next, with exemplary reference to the drawing figures, independent claim 9 sets forth a hermetic compressor comprising a housing 101 which contains oil and houses a compression mechanism 105 for compressing a refrigerant gas, the compression mechanism 105 comprising: a crankshaft 110 disposed in a vertical direction and having a main shaft 111 and an eccentric shaft 112; a cylinder; a cylindrical piston 140 arranged to reciprocate in the cylinder 131 in a direction of a cylinder axis; and a connecting portion 146 for connecting the piston 140 to the eccentric shaft 112; the piston 140 comprising: a skirt surface 152 at a side of the connecting portion 146; a top surface 151 at a side of the cylinder 131; and an outer circumferential surface 150 parallel to the cylinder 131; wherein the outer circumferential surface 150 includes a land 190, 154, 155, 160 that is on the same surface as the outer circumferential surface 150 of the piston 140 and an under cut 153 that is recessed with respect to the outer circumferential surface 150; the land comprising: a circumferentially formed land 190 formed with a predetermined width extending from the top surface 151 toward the skirt surface 152 around the piston 140; and an axially formed land 154, 155, 160 formed in a predetermined circumferential width on the outer circumferential surface 150 at circumferential locations at 0°, 90°, 180° and 270° with respect to the cylinder axis as a center, and continuously formed from the circumferentially formed land 190 to the skirt surface 152.

Thus, according to claim 9, the outer circumferential surface 150 of the piston 140 includes a land which has a circumferentially formed land 190 and an axially formed land 154, 155, 160. The circumferentially formed land is required to be formed around the piston 140 and have a width extending from the top surface 151 toward the skirt surface 152, as illustrated, for example, in Fig. 3. The claim requires the axially formed land 154, 155, 160 to have a predetermined circumferential width (i.e., circumferentially around the piston as shown in Fig. 4) on the outer circumferential surface 150 of the piston 140 at the circumferential locations at 0°, 90°, 180° and 270° (spaced at equal angular intervals about the circumference of the piston) with

respect to the cylinder axis as a center, and continuously formed from the circumferentially formed land 190 to the skirt surface 152.

As mentioned above and as recognized by the Examiner, the Kojima reference does not disclose or suggest an under cut configured in a manner as set forth in the present claims. The Examiner cited the Ellermann et al. reference for disclosing a piston having an under cut 14 (6) on the outer circumferential surface 11. However, in Ellermann et al., the under cuts 13, 14 (see column 14, lines 44-48) are disposed at symmetrical locations including the location 14 shown in Fig. 1 and a location diametrically opposite thereto; there is no disclosure or suggestion of providing both a circumferentially formed land extending around the piston and downwardly from the top surface toward the skirt surface, and an axially formed land formed at circumferential locations at 0°, 90°, 180° and 270° (at equal angular intervals about the outer circumferential surface) and continuously formed from the circumferential formed land to the skirt surface.

At the bottom of page 3 of the Office Action, the Examiner provided annotated drawings showing locations of axially formed lands, and noted "180°" and "270°" in the figure. However, although lands are formed on opposing sides of the under cut 14 in Ellermann et al., there is no disclosure in Ellermann et al. that would support the Examiner's assertion that these lands are disposed at the equal angular intervals about the circumference of the piston at 0°, 90°, 180° and 270°.

Therefore, it is submitted that the invention of claim 9 is not disclosed or suggested in any combination of Takeshi et al. and Ellermann et al. Therefore, it is submitted that claim 13, as well as claims 10 and 13 which depend therefrom, are clearly allowable over the prior art of record.

The Examiner's attention is next directed to the dependent claim 13 which depends from claim 9 and further specifies that the circumferential locations at 0°, 90°, 180° and 270° are measured circumferentially from an intersection of the outer circumferential surface 150 and the parallel direction 147 of the piston pin 142. In other words, claim 13 specifies that the locations

of the lands be provided at the equal angular intervals 0°, 90°, 180° and 270°, wherein the 0° location is at the intersection (at the top of Fig. 4 in the present application) between the outer circumferential surface 150 and the parallel direction line 147. Thus, the 90° location is at the right-hand side of Fig. 4 at the intersection of the outer circumferential surface 150 and the perpendicular line 148, the 180° location is at the bottom of Fig. 4 at the intersection of the outer circumferential surface 150 and the parallel direction line 147, and the 270° location is at the left-hand side of Fig. 4 at the intersection of the outer circumferential surface 150 and the perpendicular direction line 148. In clear contrast to this arrangement of claim 13, the Ellermann et al. patent discloses only the presence of the under cuts 14, 14 at the 0° and 180° locations as defined in claim 13.

The Examiner's attention is also directed to the dependent claims 2-8 and 12 which set forth additional features of the present invention as defined in claim 1 and thus further defines the invention over the prior art.

Thus, in view of the fact that the Ellermann et al. patent fails to disclose or suggest the features as discussed above as required by the present claims, Ellermann et al. also fails to cure the defects of the prior art and thus attain the advantages of the present invention as disclosed in the present specification at page 3, line 25 through page 4, line 1 (in the original specification). By the presence of the sliding surface existing at the parallel direction and the perpendicular direction of the piston pin as viewed in Fig. 4, the inclination of the piston 140 with respect to the cylinder 131 is suppressed, thereby suppressing any leakage of the refrigerant. Therefore, for all of the above reasons, it is believed apparent that the Takeshi and Ellermann et al. references clearly fail to disclose or suggest the present invention as recited in claims 1 and 9, as well as the dependent claims 2-8, 10, 12 and 13, and accordingly, fails to provide the advantageous effects of the present invention as described in the present specification.

As also discussed above, the tertiary references cited by the Examiner provide no teaching or suggestion that would have obviated these deficiencies of the Kojima reference and the Ellermann et al. patent.

Accordingly, for the reasons presented above, it is believed apparent that the Kojima and Ellermann et al. references provide no teaching or suggestion that would have caused a person of ordinary skill in the art to modify the Kojima arrangement or to make any combination of the references of record in such a manner as to result in or otherwise render obvious the present invention of claim 24. Therefore, it is respectfully submitted that claim 24, as well as claims 25-30 which depend therefrom, are clearly allowable over the prior art of record.

In view of the foregoing amendments and remarks, it is respectfully submitted that the present application is clearly in condition for allowance. An early notice thereof is earnestly solicited.

If, after reviewing this Amendment, the Examiner feels there are any issues remaining which must be resolved before the application can be passed to issue, it is respectfully requested that the Examiner contact the undersigned by telephone in order to resolve such issues.

Respectfully submitted,

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